

REMARKS

This constitutes Applicants' submission accompanying their concurrently filed Request For Continued Examination and is in further response to the Official Action currently outstanding with regard to the above-identified application, which Official Action the Examiner has designated as being FINAL.

Claims 1, 3-7 and 25-32 were pending at the time of the issuance of the currently outstanding Advisory Action in the above-identified application. Claims 2 and 10-24 were withdrawn previously as a result of Applicants' Response to the Examiner's Restriction Requirement. In addition, Claims 8 and 9 were canceled previously, without prejudice. By the foregoing Amendment, Applicant has further amended Claim 1 as it will stand upon the entry of the previously filed Amendment After Final Rejection.. Applicant does not propose the cancellation, addition or withdrawal of any further claims. Accordingly, Claims 1, 3-9 and 25-32 as hereinabove amended will constitute the claims under active prosecution in this application upon the entry of the foregoing Amendment.

The Claims of this application as they will stand upon the entry of the foregoing Amendment are reproduced above with appropriate status identifiers and showing the changes proposed to made in accordance with the spirit of the Rules.

Applicants respectfully submit that the foregoing Amendment is supported at pages 11 through 20 of the present application as originally filed.

Furthermore, Applicants again respectfully submit that the Chan et al reference describes "each output electrode is in electrochemical contact with an input electrode (emphasis added, see paragraphs 0013-0017 of Chan et al.). Applicant respectfully asserts that this means that the two electrodes are in indirect electrical contact with one another via an electron transfer mediator such as an electrochemically-active reporter molecule and the sensors are based on electrochemical detection. In other words, the two electrodes must NOT be directly electrically connected to each other in the cited Chan et al reference.

By contrast, in the presently claimed sensor, the first electrode is directly (now as specifically set forth in the amended language of Claim 1) electrically connected to the second electrode via a film formed by electroconductive fine particles. The claimed sensor is based on electrical detection (see, for example, page 20, lines 11-20 of the present specification) without using any electron transfer mediator.

Applicants therefore again respectfully submit that one of ordinary skill in the art at the time that the present invention was made would never have been motivated to combine Chan et al with the other references cited by the Examiner so as to form a film formed by electroconductive fine particles between the electrodes (i.e., to directly electrically connect output electrode to input electrode) in the electrochemical detection-based sensors as disclosed by Chan et al.

Accordingly, for each and all of the foregoing reasons in view of the amendments set forth hereinabove, Applicant respectfully submits that the Examiner's currently outstanding rejections now have been overcome. Therefore, entry of the foregoing Amendment, reconsideration of this application as so amended, and allowance of the presently pending claims all are respectfully requested in response to this submission.

Finally, Applicant believes that additional fees beyond those submitted herewith are not required in connection with the consideration of this supplemental response to the currently outstanding Official Action. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge and/or credit Deposit Account No. 04-1105, as necessary, for the correct payment of all fees which may be due in connection with the filing and consideration of this communication.

Respectfully submitted,

Date: September 8, 2010

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SIGNATURE OF PRACTITIONER

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S): Tsutomu Nagaoka, et al. EXAMINER: Yang, Nelson C.
SERIAL NO.: 10/578,383 GROUP: 1641
FILED: June 1, 2007 CONF. No. 1914
FOR: ELECTRICAL RESISTIVITY SENSOR AND SENSING METHOD

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

AMENDMENT AFTER FINAL REJECTION PURSUANT TO 37 CFR 1.116

In response to the Official Action currently outstanding with regard to the above-identified case, which Official Action the Examiner has designated as being FINAL, Applicant respectfully requests that the above-identified application be amended as follows so as to place it in condition for allowance, or at least in better form for Appeal, pursuant to 37 CFR 1.116.

IN THE CLAIMS:

Applicant respectfully requests that the claims of the above-identified be amended so as to read as follows whereby to place the same in condition for allowance, or at least in better form for Appeal, pursuant to 37 CFR 1.116:

1. (Currently Amended) An electric resistance type detecting sensor in which ~~a pair of electrodes consisting of a first electrode and a second electrode as a pair of electrodes are~~ is provided oppositely to each other on the surface of an electrically insulated substrate, and a film of ~~formed by~~ electroconductive fine particles modified with a probe is formed ~~on and/or between the said pair of electrodes or on and between said pair of electrodes,~~ the probe being selected from a nucleic acid and a protein, and the film being modified with the probe thereon via one end of the probe.
2. (Withdrawn) An electric resistance type detecting sensor characterized in that a recess is provided on the surface of an electrically insulated substrate, a pair of electrodes is provided oppositely to each other on the recess and a film of electroconductive fine particles modified with a probe is formed on and/or between the electrodes.
3. (Original) The electric resistance type detecting sensor according to claim 1, wherein the film of electroconductive fine particles comprises a binder.
4. (Original) The electric resistance type detecting sensor according to claim 1, wherein the probe is DNA or an antibody.

5. (Original) The electric resistance type detecting sensor according to claim 1, wherein the electroconductive fine particles are gold nano-particles.
6. (Original) The electric resistance type detecting sensor according to claim 5, wherein the binder is 1,10-decanedithiol.
7. (Previously Presented) The electric resistance type detecting sensor according to claim 4, wherein the DNA or antibody is activated with SH or NH₂ group.
8. (Canceled, without prejudice)
9. (Canceled, without prejudice)
10. (Withdrawn) An electric resistance type detecting sensor characterized in that it comprises a substrate having two or more fine recesses formed on the surface thereof; a film of electroconductive fine particles formed on the inner surface of the respective recesses; and first and second electrodes formed so as to be electrically connected to the film of electroconductive fine particles, wherein the film of electroconductive fine particles is modified with a probe.

11. (Withdrawn) An electric resistance type detecting sensor characterized in that it comprises a substrate having two or more fine recesses formed on the surface thereof; a film of electroconductive fine particles formed on the inner surface of the respective recesses; and first and second electrodes formed so as to be electrically connected to the film of electroconductive fine particles, wherein the first electrodes are formed on the surface of the substrate and the second electrodes are formed on the inside of the recesses and the film of electroconductive fine particles is modified with a probe.
12. (Withdrawn) The electric resistance type detecting sensor according to claim 10 or 11, wherein either of the first and second electrodes are electrically connected to each other.
13. (Withdrawn) The electric resistance type detecting sensor according to claim 11, wherein two or more recesses are arranged in matrix formed from a plurality of rows and columns, and the first electrode in respective rows and the second electrode in respective columns are electrically connected to each other, respectively.
14. (Withdrawn) The electric resistance type detecting sensor according to any one of claims 10 to 13, wherein the recesses are in the form of a cone.
15. (Withdrawn) The electric resistance type detecting sensor according to any one of claims 10 to 14, wherein the film of electroconductive fine particles comprises a binder.

16. (Withdrawn) The electric resistance type detecting sensor according to any one of claims 10 to 15, wherein the probe is DNA or an antibody
17. (Withdrawn) The electric resistance type detecting sensor according to any one of claims 10 to 16, wherein the electroconductive fine particles are gold nano-particles.
18. (Withdrawn) The electric resistance type detecting sensor according to claim 17, wherein the binder is 1, 10-decanedithiol.
19. (Withdrawn) The electric resistance type detecting sensor according to claim 17 or 18, wherein the DNA or antibody is activated with SH or NH₂ group
20. (Withdrawn) The electric resistance type detecting sensor according to any one of claims 17 to 19, wherein at least one end of the DNA or antibody is activated with SH or NH₂ group
21. (Withdrawn) The electric resistance type detecting sensor according to any one of claims 17 to 20, wherein both ends of the DNA or antibody is activated with SH or NH₂ group

22. (Withdrawn) An electric resistance type method of detecting the presence of a target substance which reacts with a probe, comprising:
 - modifying, with the probe, a film of electroconductive fine particles formed on the surface of an electrically insulated substrate;
 - applying a test sample including a substance to be detected to the modified film; and
 - measuring an electric resistance value between two points of the film of electroconductive fine particles.
23. (Withdrawn) An electric resistance type detecting method of detecting the presence of a target substance which reacts with a probe, comprising:
 - preparing, in advance, a test sample containing a substance to be detected and the probe;
 - applying the test sample onto a film of electroconductive fine particles formed on the surface of an electrically insulated substrate, and
 - measuring an electric resistance value between two points of the film of electroconductive fine particles.
24. (Withdrawn) The electric resistance type detecting method according to claim 22 or 23, wherein the probe is DNA or an antibody

25. (Currently Amended) The electric resistance type detecting sensor according to claim 1,
wherein the substrate has two or more fine recesses formed on the surface thereof;
the film formed by of electroconductive fine particles is formed on the inner surface of the respective recesses; and
the first and second electrodes are formed so as to be electrically connected to the film formed by of electroconductive fine particles.

26. (Previously Presented) The electric resistance type detecting sensor according to claim 25,
wherein the first electrode is formed on the surface of the substrate and the second electrode is formed on the inside of the respective recesses.

27. (Previously Presented) The electric resistance type detecting sensor according to claim 26,
wherein either of the first or second electrodes are electrically connected to each other.

28. (Previously Presented) The electric resistance type detecting sensor according to claim 25,
wherein two or more recesses formed on the surface of the substrate are arranged in a matrix formed from a plurality of rows and columns, and the first electrodes in the respective rows and the second electrode in the respective columns are electrically connected to each other, respectively.

29. (Previously Presented) The electric resistance type detecting sensor according to claim 25,

wherein the recesses are in the form of a cone.

30. (Previously Presented) An electric resistance type detecting method of detecting the presence of a target substance which reacts with a probe selected from nucleic acid and a protein, comprising:

modifying, with the probe, a film of electroconductive fine particles formed on the surface of an electrically insulated substrate;

applying a test sample including a substance to be detected to the modified film; and

measuring an electrical resistance value between two points of the film of electroconductive fine particles.

31. (Previously Presented) An electric resistance type detecting method of detecting the presence

of a target substance which reacts with a probe selected from a nucleic acid and a protein, comprising:

preparing, in advance, a test sample containing a substance to be detected and the probe,

applying the test sample onto a film of electroconductive fine particles formed on the surface of an electrically insulated substrate; and

measuring an electric resistance value between two points of the film of electroconductive fine particles.

32. (Previously Presented) The electric resistance type detecting method according to
claim 30
or claim 31, wherein the probe is DNA or an antibody.

REMARKS

This is in response to the Official Action currently outstanding with regard to the above-identified application, which Official Action the Examiner has designated as being FINAL.

Claims 1, 3-7 and 25-32 were pending at the time of the issuance of the currently outstanding Official Action in the above-identified application. Claims 2 and 10-24 were withdrawn previously as a result of Applicants' Response to the Examiner's Restriction Requirement. In addition, Claims 8 and 9 were canceled previously, without prejudice. By the foregoing Amendment, Applicant has proposed the amendment of Claims 1 and 25.. Applicant does not propose the cancellation, addition or withdrawal of any further claims. Accordingly, Claims 1, 3-9 and 25-32 as hereinabove amended will constitute the claims under active prosecution in this application upon the entry of the foregoing Amendment.

The Claims of this application as they will stand in the event that the Examiner grants the entry of the foregoing Amendment are reproduced above with appropriate status identifiers and showing the changes proposed to made in accordance with the spirit of the Rules.

More particularly, in the currently outstanding Official Action the Examiner has:

1. Re-acknowledged Applicants' claim for foreign priority under 35 USC §119 (a)-(d) or (f), and reconfirmed the receipt by the United States Patent and Trademark Office of the required copies of the priority documents for this application.
2. Reconfirmed that the drawings as filed with this application on 5 May 2006 have been accepted.

3. Deemed Claims 2, 10-24 and 30-32 to be withdrawn from further consideration. –

Applicant agrees that Claims 2 and 10-24 have been withdrawn from further consideration and agrees that those claims should have been reproduced in Applicant's previous response. That failure to reproduce withdrawn Claims 2 and 10-24 is corrected in this Amendment. Applicant, however, disagrees with the Examiner's conclusion regarding Claims 30-32 and respectfully traverses that same for the reasons discussed further below..

4. Rejected Claims 25-29 under 35 USC 112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter that Applicants regard as the invention. Specifically, the Examiner finds the terminology “fine” to be indefinite and to lack appropriate definition in the specification and claims. – Applicants agree with the Examiner to the extent that the word “fine” has been used to modify the reference to “recesses” and has amended Claims 1 and 25 so as to remove that terminology. However, to the extent that the word “fine” is utilized to modify the word “particles” Applicant respectfully note that “fine particles” are defined as being 50 to 100 nm in the present specification –see page 9 – and therefore the latter use of the word “fine” in the claims is deemed to be appropriate.

5. Rejected Claims 1, 3-5, 7, and 25-28 under 35 USC 103(a) as being unpatentable over Chan et al (US Published Patent Application No. 2002/0090649) in view of Yamashita (US Published Patent Application No. 2004/0018548).

6 Rejected Claim 6 under 35 USC 103(a) as being unpatentable over Chan et al and Yamashita in view of Vossmeyer et al (US Published Patent Application No. 2002/0132361)

7. Rejected Claim 29 under 35 USC 103(a) and (e) as being unpatentable over
Chan et al and Yamashita in view of Coasson et al (US 6,229,603).

Further comment regarding items 1, 2 and 4 above is not deemed to be required in these
Remarks.

With respect to item 3 above, Applicants respectfully submit that none of the documents cited by the Examiner teaches, describes or suggests the special technical feature of the presently claimed invention that a film formed by electroconductive fine particles is formed between the electrodes.

With respect to the remaining items summarized above, on the other hand, Applicants have the following comments for the consideration of the Examiner.

Applicants respectfully submit that the Chan et al reference describes "each output electrode is in electrochemical contact with an input electrode (emphasis added, see paragraphs 0013-0017 of Chan et al.). Applicant respectfully asserts that this means that the two electrodes are in indirect electrical contact with one another via an electron transfer mediator such as an electrochemically-active reporter molecule and the sensors are based on electrochemical detection. In other words, the two electrodes must NOT be directly electrically connected to each other.

By contrast, in the presently claimed sensor, the first electrode is directly electrically connected to the second electrode via a film formed by electroconductive fine particles. The claimed sensor is based on electrical detection (see, for example, page 20, lines 11-20 of the present specification) without using any electron transfer mediator.

Applicants respectfully submit that one of ordinary skill in the art at the time that the present invention was made would never have been motivated to combine Chan et al with the other references cited by the Examiner so as to form a film formed by electroconductive fine particles between the electrodes (i.e., to directly electrically connect output electrode to input electrode) in the electrochemical detection-based sensors as disclosed by Chan et al.

Accordingly, for each and all of the foregoing reasons in view of the amendments set forth hereinabove, Applicant respectfully submits that the Examiner's currently outstanding rejections now have been overcome. Therefore, entry of the foregoing Amendment, reconsideration of this application as so amended, and allowance of the presently pending claims all are respectfully requested in response to this submission.

Finally, Applicant believes that additional fees beyond those submitted herewith are not required in connection with the consideration of this supplemental response to the currently outstanding Official Action. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge and/or credit Deposit Account No. 04-1105, as necessary, for the correct payment of all fees which may be due in connection with the filing and consideration of this communication.

Respectfully submitted,

Date: August 5, 2010

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